

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacturing method and manufacturing installation of a rubber-like polymer.

[0002]

[Description of the Prior Art] As shown, for example in drawing 6 in the manufacturing process of a synthetic rubber, after the polymerization tank's 2 performing a polymerization reaction and obtaining a cement-like rubber solution, with the solidifying device 9 which comprises a large-sized coagulation tank (for example, tanks 4, 6, and 8). A rubber-like polymer component is deposited, and it washes, and a crumb-like rubber-like polymer is obtained. Then, the fluid containing the rubber-like polymer of the shape of this crumb is conveyed to a drying means with the pump 10 etc., and the rubber-like polymer of dryness is obtained.

[0003] Through the solidifying device 9, the polymer before drying desiccation is making the shape of a crumb, and contains a lot of moisture inside. In the centrifugal dehydrator, \*\*\*\*\* drying cannot be carried out, therefore moisture is evaporated by the hot air drying using a heat source, and after considering it as dryness, it is made as [ supply / a making machine ] by drying of such a rubber-like polymer with much water content.

[0004] However, since it not only needs huge energy, but is exposed under an elevated temperature for a long time according to this stoving means, the rubber-like polymer itself deteriorates. And since these stoving means will be formed apart from the supply system to a making machine, the increase in an installation cost is caused, and also there were various problems of leading to increase of an installing space.

[0005] Then, it is made to dry in the stage which supplies a raw material to the molding part of a making machine, and the biaxial extrusion machine (JP,59-214631,A) aiming at solution of the above-mentioned problem is proposed. In a predetermined interval, this thing forms a collar-like part in shaft orientations, carries out consolidation of the hydrous raw material to two screws rotated to a different direction by this collar-like part, presses out moisture, and is made as [ make / it / drain from the vent-port provided in a barrel ].

[0006]

[Problem(s) to be Solved by the Invention] However, in the conventional manufacturing method and manufacturing installation of the rubber-like polymer, as shown in drawing 6, since the large-sized solidifying device 9 was needed, operation is complicated, bad moreover operability needed the great installing space, and facility cost and a manufacturing cost were increased in the coagulating process.

[0007] In a conventional method and device, production of an adhesive high rubber-like polymer or the rubber-like polymer of low Mooney viscosity was remarkably difficult.

[0008] This invention is made in view of such the actual condition, and its operability improves (operation becomes simple and). The loss of a product falls also the time of the change of the kind of rubber-like polymer which should be produced, And shortening of switching time is aimed at, moreover reduction of a process and apparatus is enabled, and it aims at providing the manufacturing method and manufacturing installation of the rubber-like polymer which can aim at reduction of an installation cost, and reduction of a manufacturing cost. The purpose of this invention is to provide the manufacturing method and manufacturing installation of the rubber-like polymer which can also produce easily an adhesive high rubber-like polymer and rubber-like polymer of low Mooney viscosity.

[0009]

[Means for Solving the Problem] To achieve the above objects, a manufacturing method of a rubber-like polymer concerning this invention, Add a solidified solution to a cement-like rubber solution, and a rubber-like polymer component is deposited, It is a manufacturing method of a rubber-like polymer which obtains a rubber-like polymer of dryness by drying a rubber-like polymer component which deposited, Cement-like a rubber solution and a solidified solution are supplied independently just before an entrance of a rotary wing of a pump with a crushing function, respectively, this rubber solution and solidified solution are contacted, and it sends to a drying means with said pump promptly.

[0010] A manufacturing installation of a rubber-like polymer concerning this invention is provided with the following.

Cement informer stage which sends a cement-like rubber solution.

Solidified solution informer stage which sends a solidified solution for depositing a rubber-like polymer component in a rubber solution.

A pump with a crushing function with which a suction port was constituted so that a rubber solution and a solidified solution which were sent by said cement informer stage and a solidified solution informer stage, respectively might contact just before an entrance of a rotary wing.

A drying means which dries a slurry containing a crumb-like rubber-like polymer which is crushed with said pump with a crushing function, and is sent, and obtains a rubber-like polymer of dryness.

[0011] Although all of edge-less type pumps, such as a pump with an edge or a homogenizer, a HAISHI exhaust air mixer, etc. by which it has equipped with a rotary blade before a rotary wing, can be used for a suction port of a pump with a crushing function, it is preferred that it is a pump with an edge from a viewpoint of productivity. Especially as a pump with a crushing function, although not limited, what is called what is called a crushing pump is preferred. A flow or a flow of shaft orientations of a centrifugal direction may be sufficient as a flow of a fluid in a pump. As for a regurgitation line of a pump, it is preferred to give the rate of flow of 1 m/second or more. The one where distance of a regurgitation line to a drying means is also shorter is preferred.

[0012] As for a drying means, it is preferred to have a cleaning means. Wash water is supplied in a cleaning means. As for quantity of water with which wash water is presented, it is preferred that it is about 1:1-1:30 in a weight ratio to a rubber-like polymer component. Even if there is not much too much this wash water, there is a possibility that wash water may not be used effectively, but it may become insufficient collecting it wash water, and it may become a cause by which a rubber-like polymer is not dried. Temperature of water with which wash water is presented has preferred warm water more than 40 degreeC. It is because a cleaning effect improves.

[0013] As a drying means, as shown in JP,6-9825,B, provide in parallel two screws which carried out temperature control in a barrel, rotate these screws in the direction, and. A feeding barrel which accepts a slurry in which said barrel contains a rubber-like polymer toward a tip from the feeding side using the said direction rotation engagement type biaxial extrusion machine which got into gear so that it might be as much as possible close, and changed peak parts and a trough of a screw into a state, It is preferred that it is a dryer which has at least one drying barrel which has outlets, such as a slit which discharges a fluid dried from a slurry containing a rubber-like polymer.

[0014] As for a drying barrel, it is preferred to equip the preceding paragraph and at least two latter parts of a dryer, as for a slit gap of a drying barrel of the preceding paragraph, it is preferred that it is larger

than a latter thing, and it is preferred to choose a wedge type screen which is about 0.1-0.2 mm. As for a crevice between slits of a latter drying barrel, about 0.05-0.1 mm is preferred. As for a drying barrel of the preceding paragraph, serving as a feeding barrel is preferred, and it is preferred to make Ceram which narrows down a slurry containing a crumb-like rubber-like polymer and contains a solvent discharge promptly. Ceram itself is difficult to send into the latter part by a screw of a biaxial extrusion machine, and it causes [ so-called ] SHABUTSUKI. SHABUTSUKI is that return to an entrance side, without discharging enough Ceram stuffed into a biaxial extrusion machine, and a stake lump of a crumb worsens.

[0015] Said feeding barrel (desirable with a slit), a vent barrel equipped with an air vent and a vacuum vent other than said drying barrel, a wash water supply barrel to which wash water is supplied, and a mere thing [ usually having a barrel further ] of a dryer are preferred. Although a thing of marketing with a check valve may be sufficient as a washing water supply port with which a wash water supply barrel is equipped, making clearance with a flight of a screw into the minimum becomes a leading means by which a feed hopper is not made to blockade. In a vent barrel, when extracting gas, an internal rubber-like polymer component carries out a vent rise, or a flake rise is carried out, and there is a possibility of making a byroad of gas blockading. In order to prevent such a point, it is preferred to put wedge-shaped infeed into an inner surface of a bent block in a vent barrel, and to make a rubber-like polymer component eat into it in a barrel. When a vent rise and a flake rise are still more intense, it is preferred to use a vent barrel as a barrel with a slit.

[0016] In this invention, as a drying means, in using an above-mentioned biaxial extrusion machine type dryer, As for a screw directly under [ to which a crumb-like rubber-like polymer is supplied ] a feed zone, it is preferred to make a trough deep, and to enlarge a pitch, and to constitute so that a large crumb of \*\* with high water content may be promptly sent into a post process. Because, although this portion is a closed system, it is because it is what is not pushed in with a discharge pressure of a pump with a crushing function, and is pushed in by rotation of a screw by an atmospheric pressure system. A shortage of delivery by a screw produces plugging in a feed zone, has a possibility of falling into a supply stop, and is not preferred. It becomes possible by making a trough of a screw deep and enlarging a pitch to be able to lower number of rotations of a screw and to lower temperature of a die.

[0017] It is preferred to equip a screw within a usual barrel after discharging Ceram with one order kneading disk and one reverse kneading disk in series. A thing which equip with two order kneading disks a screw within a wash water supply barrel which continues after that, and follows it and for which a screw in a barrel is usually equipped with one reverse kneading disk, mixing with wash water and a crumb is improved, and a part for soap is extracted is preferred. A barrel usually follows the latter part of this usual barrel with a drying barrel, it is connected to it, and this thing [ usually equipping with one order kneading disk and one reverse kneading disk in series in a barrel ] is preferred. A drying barrel after this wash water supply barrel is for pressing out wash water in a crumb.

[0018] A barrel connected after a barrel for pressing out wash water turns into a barrel for a deliquoring process, i.e., a drying process. Although the number of barrels connected changes with grades of desiccation, it has at least two vent barrels and a usual barrel connected between them. As for at least one of vent barrels, it is preferred that it is an air vent barrel which leads to an atmospheric pressure system, and, as for other at least one, it is preferred that it is a vacuum vent barrel which leads to a depressurizing system. As for a screw located in a usual barrel between these vent barrels, in order to deaerate by promoting renewal of the surface of a crumb, it is preferred to equip with one order

kneading disk, and one neutral disk and one reverse kneading disk as a group. When backwashing by water runs short, increase a wash water supply barrel which should connect and it equips with a drying barrel accompanying it, and it has composition of a screw corresponding to them.

[0019]As for a barrel of the latter part after it, although temperature in particular of a barrel is not limited, a barrel of the preceding paragraph to a barrel which makes wash water discharge has preferred 40-70 degreeC, and maintaining at 150-170 degreeC is preferred. If a cleaning effect falls and it is too high when temperature of a barrel in the preceding paragraph is low, Ceram and wash water will gasify, breathing will be started, and a smooth flow in a biaxial machine will be checked. Degradation of a product will be caused if temperature of a latter barrel is too high. Conversely, deaerating will become insufficient if too low.

[0020]As for all Ceram water containing a solvent which narrowed down a slurry containing a crumb-like rubber-like polymer and was discharged in a drying means, it is preferred to collect and to send to solvent refining processes, and it is preferred to circulate it, as it is shown below. First, as for this recycled water, although fresh process water is supplied as wash water of a biaxial extrusion machine type dryer in a barrel position after collecting Ceram and it is recovered by wedge screen of a latter drying barrel, etc., it is preferred as a solidified solution to supply a suction port of a pump with a crushing function. Although a washed solvent is contained in recycled water severalpercent (for example, 3%) and a detailed crumb which leaked and came out on a wedge screen is contained in it, these will all be collected by making it circulate in this way. It combines and leads to reduction of consumption of process water.

[0021]As a solidified solution, water is used, for example. Although the amount of supply in particular of a solidified solution is not limited, 1:0.05 to about 1:3 are preferred to a solvent (for example, acetone) of a rubber solution at a volume ratio. When there is too little amount of supply of a solidified solution, there is a possibility of it not resulting by the time it deposits a rubber-like polymer component within a pump, and separation with a crumb and a fluid not being performed good, but a loss of a crumb arising, or having an adverse effect on an effect of future washing by a drying means. When there is too much amount of supply of a solidified solution, although it has good influence on an effect of washing, in a drying means, a shortage of separation of a fluid from a crumb arises, and work which collects and reuses a solvent from a separated fluid (solvent + solidified solution) becomes difficult.

[0022]Although temperature of a solidified solution supplied in a solidified solution informer stage changes also with the kinds of solvents, such as acetone in a rubber solution, it is high, and it is preferred that it is lower than the boiling point of a solvent, for example, it is more preferred than ordinary temperature. [ of a 30-60 degreeC grade ] By setting temperature of a solidified solution as such a range, a crumb becomes soft, and intrusion of a crumb in a biaxial extrusion machine as a drying means is performed smoothly, and it is because a part for soap in a rubber solution is extracted a priori and a cleaning effect is demonstrated. As for temperature of a rubber solution supplied in a cement informer stage from such a viewpoint, it is preferred that it is comparable as temperature of a solidified solution.

[0023]In a manufacturing method and a manufacturing installation of a rubber-like polymer concerning this invention, as a cement-like rubber solution, Although not limited in particular, an acrylonitrile butadiene copolymerization rubber (NBR) solution which uses acetone as a solvent, for example, a mallein-ized NBR solution, a hydrogenation NBR solution, a mallein-ized hydrogenation NBR solution, etc. can be illustrated, and water is used as a solidified solution in that case. In this invention, in a solution polymerization system, it can send into a pump with a crushing function by the ability to use the

3rd solvent (solvent) as a solidified solution, a rubber solution can be poor-solvent-ized, a rubber-like polymer can be deposited, and washing desiccation can also be performed by the aforementioned technique. With for example, a solidified solution which consists a crawl hydrin rubber solution which polymerized in benzene of solvents, such as cyclohexane or methanol. Crawl hydrin rubber of dryness can also be obtained by sending into a suction port of a pump with a crushing function independently, and acquiring a drying process in a drying means.

[0024]

[Function]In the manufacturing method using the manufacturing installation of the rubber-like polymer concerning this invention, cement-like a rubber solution and a solidified solution are supplied independently just before the entrance of the rotary wing of a pump with a crushing function, respectively, and this rubber solution and solidified solution are contacted and are promptly sent to a drying means with said pump. For this reason, before the rotary wing of a pump, a deposit of a rubber-like polymer arises, and the rubber-like polymer which deposited serves as a slurry which is crushed with a pump with a crushing function and contains the rubber-like polymer crumb of a suitable size to be conveyed, and is sent to a drying means. Ceram is collected from the slurry containing a rubber-like polymer in a drying means.

Then, a rubber-like polymer is washed by wash water, next deaeration desiccation is carried out.

Thus, it was checked that the rubber-like polymer of the obtained dryness has a rubber-like polymer obtained by a conventional method and device and the quality more than equivalent.

[0025]Therefore, in the manufacturing method using the manufacturing installation of the rubber-like polymer concerning this invention. The solidifying devices which comprise the large-sized tank used conventionally are reducible, and in a drying process, since furnishing of a slurry tank tank, a screen, etc. becomes unnecessary, reduction of a process and apparatus is enabled and reduction of an installation cost and reduction of a manufacturing cost can be aimed at. Operation becomes simple, the loss of a product falls, and the time of the change of the kind of rubber-like polymer which should be produced can also aim at shortening of switching time, and its operability improves. Furthermore by this invention, an adhesive high rubber-like polymer and rubber-like polymer of low Mooney viscosity are also easily producible.

[0026]In this invention, the metering accuracy of a raw material or a product can improve remarkably, and automation of a manufacturing process can be made easy. Namely, since the flow of the rubber solution of the shape of cement sent into a pump with a crushing function can be correctly measured in this invention and the quantity is supplied to a drying means as it is, Stable operation is not only obtained, but it can perform easily supplying other ingredients in proportion to the amount of crumbs, for example. On the other hand, it is difficult from being easy to carry out adhesion stagnation of the crumb to supply quantitatively the slurry which contains a crumb-like rubber-like polymer in the drying means which comprises the extrusion dryer of biaxial or one axis in the conventional method. In the former, although installing a shock-type crumb flow instrument is also considered, it is low precision.

[0027]

[Embodiment of the Invention]Hereafter, the manufacturing method and manufacturing installation of the rubber-like polymer concerning this invention are explained in detail based on the embodiment shown in a drawing.

[0028]As for the exploded perspective view of a pump with a crushing function, and drawing 3, the schematic diagram of a biaxial screw and drawing 5 of the cross-sectional view of a dryer and drawing 4

are [ the schematic diagram of the manufacturing installation of the rubber-like polymer which requires drawing 1 for one embodiment of this invention, and drawing 2 ] the outline sectional views of a screw.

[0029]As shown in drawing 1, the manufacturing installation 12 of a rubber-like polymer has the pump 14 with a crushing function, and the dryer 16 as a drying means. The dryer 16 concerning this embodiment is a what is called biaxial extrusion machine type dehydrating dryer.

As it is indicated in drawing 1 as the two screws 18 and 18 shown in drawing 4, it has two or more barrels 20a-20n surrounding these screws 18 and 18.

The screws 18 and 18 shown in drawing 4 are rotated by the motor 22 shown in drawing 1, respectively.

As shown in drawing 3 and 4, the screws 18 and 18 are the geared types biting so that the mutual peak parts 18A and the trough 18B might be as much as possible close, and the spiral direction of the screws 18 and 18 is made the same by right and left, and they rotate it to a uniform direction.

[0030]The barrel 20a shown in drawing 1 is a feeding barrel.

It has the feeding mouth 24 which receives the slurry containing the crumb-like rubber-like polymer sent from the pump 14.

The barrel 20n of a final stage has the delivery 26, and fabricates continuously the product which comprises the rubber-like polymer of tabular or the line after desiccation. These barrels [ 20a-20n ] details are mentioned later.

[0031]The pump 14 with a crushing function shown in drawing 1 is called what is called a crushing pump.

As shown in drawing 1 and 2, it has equipped with the rotary blade 34 for crushing, and the rotary wing 36 for liquid sending in the pump case 28 which has the suction port 30 and the delivery 32, enabling free rotation.

The rotary blade 34 is for crushing the crumb contained in the fluid absorbed from the suction port 30. With the rotary wing 36 for performing the suction and regurgitation of a fluid, it rotates by the motor 37.

[0032]The suction port 30 is equipped with the adapter 38. Have formed the two channels 40 and 42 in the adapter 38 independently, and in one channel 40. The cement transport piping 44 as a cement informer stage into which a cement-like rubber solution is sent is connected, and the solidified solution transport piping 46 as a solidified solution informer stage in which a solidified solution is sent into the channel 42 of another side is connected.

[0033]The cement transport piping 44 conveys the rubber solution of the shape of cement containing the rubber-like polymer which polymerized by the polymerization tank 2 shown, for example in drawing 6 to the suction port 30 of the direct pump 14. The pump for transportation is arranged in the middle of the piping 44. In this embodiment, the rubber solution conveyed for the piping 44 dissolves rubbers, such as NBR, with solvents, such as acetone, is a viscous fluid (cement) and contains a part for rubber about 12 to 13% of the weight.

[0034]The solidified solution conveyed by the solidified solution transport piping 46 is water, for example.

According to this embodiment, in order to reduce consumption of water and to lose the utility of a crumb, the wash water collected from the drying barrel 20e shown in drawing 1 mentioned later is used. That is, the wash water containing some crumbs is collected, a pump etc. convey from the tank which stored the wash water, and the suction port 30 of the pump 14 is supplied from the piping 46 as

solidified water. Although the amount of supply in particular of the solidified water from the piping 46 is not limited, 1:0.05 to about 1:3 are preferred to the solvent (for example, acetone) of a rubber solution at a volume ratio. When there is too little amount of supply of solidified water, there is a possibility of it not resulting by the time it deposits a rubber-like polymer component within a pump, and separation with a crumb and a fluid not being performed good, but the loss of a crumb arising, or having an adverse effect on the effect of future washing processes with the dryer 16. When there is too much amount of supply of solidified water, although it has good influence on the effect of washing, in the dryer 16, the shortage of separation of the fluid from a crumb arises, and the work which collects and reuses a solvent from the separated fluid (solvent + solidified solution) becomes difficult.

[0035]Although the temperature of the solidified water supplied through the piping 46 changes also with the kinds of solvents, such as acetone in a rubber solution, it is high, and it is preferred that it is lower than the boiling point of a solvent, for example, it is more preferred than ordinary temperature. [ of a 30-60 degreeC grade ] It is because a crumb becomes soft, intrusion of a crumb to the biaxial screw 18 within the dryer 16 is performed smoothly, and a part for the soap in a rubber solution is extracted a priori and a cleaning effect is demonstrated by setting the temperature of solidified water as such a range. As for the temperature of the rubber solution supplied by the cement transport piping 44 from such a viewpoint, it is preferred that it is comparable as the temperature of solidified water.

[0036]Drawing 1 and the adapter 38 shown in 2 are inserted into the suction port 30 so that the rubber solution and solidified water which were sent, respectively by the cement transport piping 44 and the solidified solution transport piping 46 may contact just before the rotary wing 36 and the entrance of the rotary blade 34. It may equip with the lattice etc. in which the slit was formed between the rotary blade 36 and the rotary wing 36.

[0037]The delivery 32 of the pump 14 is connected to the feeding mouth 24 of the dryer 16 through the slurry feed piping 48 shown in drawing 1. As for the speed of the fluid in the slurry feed piping 48, it is preferred to give the rate of flow of 1 m/second or more. The one where the length of this piping 48 is also shorter is preferred.

[0038]The 1st drying barrel 20b1 in which the slit etc. are formed is connected to the latter-part side of the feeding barrel 20a with the feeding mouth 24. In the 1st drying barrel 20b1, the Ceram water which extracted from the slurry by rotation of the screws 18 and 18, and came out is discharged by a slit. As for all the Ceram water containing the solvent discharged by the slit, it is preferred to collect and to send to solvent refining processes. As for the interval of the slit of this 1st drying barrel 20b1, it is preferred that it is larger than the interval of the slit of the 2nd drying barrel 20e mentioned later, and it is preferred to choose the wedge type screen which is about 0.1-0.2 mm.

[0039]The wash water supply barrel 20c is usually connected to the latter-part side of the 1st drying barrel 20b1 via the barrel 20b2. This barrel 20c is equipped with the washing water supply port 50, and wash water is supplied to the inside of the barrel 20c from here. Although the thing of marketing with a check valve may be sufficient as this washing water supply port 50, making clearance with the flight of the screw 18 into the minimum becomes a leading means by which the feed hopper 50 is not made to blockade. In this embodiment, fresh process water is used as wash water.

[0040]As for the quantity of the water with which wash water is presented, it is preferred that it is about 1:1-1:30 in a weight ratio to a rubber-like polymer component. Even if there is not much too much this wash water, there is a possibility that wash water may not be used effectively, but it may become insufficient collecting it wash water, and it may become a cause by which a rubber-like polymer is not

dried. The temperature of the water with which wash water is presented has preferred warm water more than 40 degreeC. It is because a cleaning effect improves.

[0041]The latter part of the wash water supply barrel 20c is usually equipped with the barrel 20d. Usually, the barrel 20d has a temperature control means for controlling the inside of a barrel to a predetermined temperature. The 2nd drying barrel 20e is connected to the this barrel [ 20d ] latter part. The 2nd drying barrel 20e is equipped with the Weggis clean type slit etc., and the wash water supplied by the wash water supply barrel 20c is discharged, and is collected. As for the slit gap of this barrel 20e, about 0.05-0.1 mm is preferred. Although the washed solvent (solvent) is contained in the wash water collected here severalpercent (for example, 3%) and the detailed crumb which leaked and came out on the wedge screen is contained in it, All of a solvent and a detailed crumb will be collected by supplying the suction port 30 of a pump, using this recycled water as solidified water. It combines and leads to reduction of consumption of process water.

[0042]The barrels 20f-20n used as a deaeration drying process are connected to the latter-part side of the 2nd drying barrel 20e. Although the temperature of a barrel is set as a 40-70 degreeC grade in the barrels 20a-20e of the former preceding paragraph, it is more desirable than it, and as for the barrels 20f-20n of the latter part after it, maintaining at 150-170 degreeC is preferred. If a cleaning effect falls and it is too high when the temperature of the barrel in the preceding paragraph is low, Ceram and wash water will gasify, breathing will be started, and the smooth flow by the biaxial screw 18 will be checked. Degradation of a product will be caused if the temperature of a latter barrel is too high. Conversely, deaerating will become insufficient if too low.

[0043]20g of air vent barrels usually connected to the barrel [ 20f ] latter-part side among latter barrels are equipped with the air vent 52 which is open for free passage to atmospheric pressure, and discharges evaporated material, and the solvent and water which are contained in the slurry after washing are volatilized, and it removes. The latter part of 20 g of this air vent barrel is usually equipped with the barrels 20h and 20i, the vacuum vent barrel 20j, the usual barrels 20k and 20l., 20 m of vacuum vent barrels, and 20 m of die wearing barrels in this order. The vacuum vent barrels 20j and 20m are equipped with the vents 54 and 56, these vents 54 and 56 are connected to the pump for vacuum suction, or the vacuum tank, and the volatile constituent contained in the rubber-like polymer in a barrel is exhausted compulsorily.

[0044]In these vent barrels 20g, 20j, and 20m, when extracting gas, an internal rubber-like polymer component carries out a vent rise, or a flake rise is carried out, and there is a possibility of making the byroad of gas blockading. In order to prevent such a point, it is preferred to put wedge-shaped infeed into the vent barrels 20g and 20j and the inner surface of the bent block in 20m, and to make a rubber-like polymer component eat into them in a barrel. When a vent rise and a flake rise are still more intense, it is good also considering the vent barrels 20g, 20j, and 20m as a barrel with a slit.

[0045]The composition of the screws 18 and 18 to these split barrels is shown below. As shown in drawing 4, in the field corresponding to the feeding barrel 20a and the 1st drying barrel 20b1, it is considered as the forward-stitch screw 60. And the trough of the screws 18 and 18 is made deep, and a pitch is enlarged, and it constitutes so that the large crumb of \*\* with high water content may be promptly sent into a post process. Because, although this portion is a closed system, it is because it is what is not pushed in with the discharge pressure of a pump with a crushing function, and is pushed in by rotation of a screw by an atmospheric pressure system.

[0046]The screws 18 and 18 located in the usual barrel 20b2 by the side of the latter part of the barrel



20b1 which discharges Ceram are equipped with the order kneading disk 62 of one sheet, and the reverse kneading disk 63 of one sheet in series, as shown in [drawing 4](#). To the screws 18 and 18 within the wash water supply barrel 20c which continues after that. It equips with two order kneading disks which have carried out the graphic display abbreviation, and equips with one reverse kneading disk following it which has usually carried out the graphic display abbreviation at the screws 18 and 18 in the barrel 20d, mixing with wash water and a crumb is improved, and a part for soap is extracted. The barrel 20f usually follows the this usual barrel [ 20d ] latter part with the drying barrel 20e, and it is connected to it, and has equipped with the order kneading disk 68 of one sheet, and the reverse kneading disk 69 of one sheet in series in this usual barrel 20f.

[0047]As shown in [drawing 4](#), the backward-feed screws 64, 70, and 74 and the passing <a thing> on screws 66, 72, and 76 are arranged by turns at the screws 18 and 18 if needed. In order to prevent the thing which said screws 18 and 18 depend on the frictional heat at the time of a transfer of a rubber-like polymer, etc. and to heat, As shown in [drawing 5](#), the inside of shaft orientations of the screw 18 is made hollow over an almost all region, the pipe material 78 is inserted in this centrum, and the cooling water delivery pipe 80 is inserted into this pipe material 78. To this pipe 80, after the cooling medium which the cooling medium by which temperature control was beforehand carried out through the control valve etc. was supplied, and was supplied from this pipe circulates the inside of the pipe material 78 to shaft orientations, it is discharged from the end outlet of the pipe material 78. As a result, the screw 18 is cooled from an inside.

[0048]The slurry which contains the crushing crumb supplied from the feeding mouth 24 in the dryer 16 concerning this embodiment, If it results in the portions of the order kneading desk 62 which it is sent to the downstream by rotation of the direction of the screws 18 and 18 on either side, and is shown in [drawing 4](#), the reverse kneading disk 63, and the backward-feed screw 64, A slurry serves as an opposite direction transfer, a squeezing operation takes place, Ceram water is separated from a slurry, and the Ceram water is discharged outside from the slit of the 1st drying barrel 20b1 shown in [drawing 1](#).

[0049]Then, wash water is supplied by the wash water supply barrel 20c, a slurry is washed, and the wash water is collected by the drying barrel 20e. Some solvents contained in a slurry by such washing are flushed with wash water. Then, a slurry is dried and deaerated by the barrels 20f-20n shown in [drawing 1](#), and, eventually, the sheet shaped or linear Plastic solid (product) which comprises the rubber-like polymer of dryness is acquired from the dice with which the barrel 20n is equipped.

[0050]In the manufacturing method using the manufacturing installation 12 of the rubber-like polymer concerning this embodiment. Cement-like a rubber solution and a solidified solution are supplied independently just before the rotary wing 36 of the pump 14 with a crushing function, and the entrance of the rotary blade 34, respectively, and this rubber solution and solidified solution are contacted and are promptly sent to the dryer 16 with said pump 14. For this reason, before the rotary blade 34 of the pump 14, a deposit of a rubber-like polymer arises, and the rubber-like polymer which deposited serves as a slurry which is crushed by the rotary blade 34 and contains the rubber-like polymer crumb of a suitable size to be conveyed, and is sent to the dryer 16. Ceram is collected from the slurry containing a rubber-like polymer in the dryer 16.

Then, a rubber-like polymer is washed by wash water, next deaeration desiccation is carried out. Thus, it was checked that the rubber-like polymer of the obtained dryness has a rubber-like polymer obtained by a conventional method and device and the quality more than equivalent.

[0051]Therefore, in the manufacturing method using the manufacturing installation 12 of the rubber-like polymer concerning this embodiment, the solidifying devices which consist of a coagulation tank used conventionally can be reduced, reduction of a process and apparatus is enabled, and reduction of an installation cost and reduction of a manufacturing cost can be aimed at. Operation becomes simple, the loss of a product falls, and the time of the change of the kind of rubber-like polymer which should be produced can also aim at shortening of switching time, and its operability improves. Furthermore by this embodiment, an adhesive high rubber-like polymer and rubber-like polymer of low Mooney viscosity are also easily producible.

[0052]In this embodiment, the metering accuracy of a raw material or a product can improve remarkably, and automation of a manufacturing process can be made easy. Namely, since the flow of the rubber solution of the shape of cement sent into the pump 14 with a crushing function can be correctly measured in this embodiment and the quantity is supplied to the dryer 16 as it is, Stable operation is not only obtained, but it can perform easily supplying other ingredients in proportion to the amount of crumbs, for example.

[0053]this invention is not limited to the embodiment mentioned above, within the limits of this invention, can be boiled variously and can be changed.

[0054]for example, a barrels [ which is shown in drawing 1 / 20a-20n ] number in particular is not limited, but can be changed to versatility. Screw constitution can be changed by choosing various composition of a barrel.

[0055]

[Example]Hereafter, although this invention is explained based on a still more concrete example, this invention is not limited to these examples.

[0056]The manufacturing installation 12 which has example 1 drawing 1, the pump 14 with a crushing function shown in 2, and the dryer 16 was prepared. The structure of the suction port 30 was improved using drawing 1 and the adapter 38 as shown in 2, using form HD4 MCs-SC of Komatsu Zenoah Co. as the pump 14. The number of rotations of a pump is 1750 rpm.

Flow capability was 10m<sup>3</sup>/H and the head was 20 m.

Using the biaxial extrusion dryer by Toshiba Corp. (TEM-50B-12/4V, ratio-of-length-to-diameter=41.5) as the dryer 16, it improved so that a washing process could be performed. The output of the drive motor of a dryer is 55 kW.

The maximum engine speed was 440 rpm and the number of barrels was 12.

Recovery of Ceram described by said embodiment, washing of a rubber-like polymer, and deaeration desiccation considered composition of the screw as composition which is performed with sufficient convenience by each barrel.

[0057]As a rubber solution supplied from the cement transport piping 44 shown in drawing 1, the amount of [ which comprises NBR ] rubber used what was melted with the acetone solvent. A part for rubber was contained 12 to 13% of the weight to the whole solution. As solidified water supplied from the solidified water transport piping 46, the water collected by the drying barrel 20e of the dryer 16 was used. The supply flow rate of the rubber solution was a part for 7.5-l./, and the supply flow rate of water was a part for 15-l./.

[0058]15 l./m of fresh water was supplied to the wash water supply barrel 20c. The pressure reduction tank of the degree of vacuum of 20Torr was connected to the vacuum vents 54 and 56.

[0059]When the aridity of the rubber goods obtained from the barrel 20n of the final stage of a dryer is

investigated, the content of moisture is 0.24 % of the weight to the whole.

It was checked that it is quality equivalent to the rubber goods obtained by the conventional method. When the vulcanization curve of these rubber goods was investigated, it was checked that they are the rubber goods obtained by the conventional method and the quality more than equivalent. The residual percentage of the solvent in the rubber goods obtained by the method of this example is 0.03 % of the weight to the whole.

It was checked that they are the rubber goods obtained by the conventional method and the quality more than equivalent.

[0060]

[Effect of the Invention]As explained above, according to the manufacturing method using the manufacturing installation of the rubber-like polymer concerning this invention, the large-sized solidifying devices used conventionally can be reduced, reduction of a process and apparatus is enabled, and reduction of an installation cost and reduction of a manufacturing cost can be aimed at. Operation becomes simple, the loss of a product falls, and the time of the change of the kind of rubber-like polymer which should be produced can also aim at shortening of switching time, and its operability improves. Furthermore by this invention, an adhesive high rubber-like polymer and rubber-like polymer of low Mooney viscosity can also be produced easily, without a rubber-like polymer adhering in a coagulation tank.

[0061]In this invention, the metering accuracy of a raw material or a product can improve remarkably, and automation of a manufacturing process can be made easy. Namely, since the flow of the rubber solution of the shape of cement sent into a pump with a crushing function can be correctly measured in this invention and the quantity is supplied to a drying means as it is, Stable operation is not only obtained, but it can perform easily supplying other ingredients in proportion to the amount of crumbs, for example.